

S1 EP20 - The Evolution of Cloud Storage and Memory

Friday, September 2, 2022 · 10:07

Jon Haswell, Senior Vice President, Firmware and Gary Kotzur, CTO, Storage Products Group join the Marvell Essential Technology Podcast to discuss the evolution of cloud storage and memory. As demands for workloads scale public and hybrid cloud environments face tremendous pressure to provide optimal performance while remaining cost-competitive. Designing the highest performing cloud storage and memory infrastructure for all workloads remains an expensive proposition at cloud scale, leading to underutilized resources. Optimizing NVMe and CXL-based silicon solutions from both a hardware and firmware perspective provides the key to success in driving the foundation for most of the scalable data center infrastructure. Learn more about some of the critical attributes of cloud storage, how the Compute Express Link (CXL) transformation is evolving, and the evolution of the cloud.

Speakers

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C Christopher Banuelos 00:04

Welcome to the Marvell Essential Technology Podcast. I'm your host, Chris Banuelos. On today's episode, join in on a conversation with Jon Haswell and Gary Kotzur discussing the evolution of cloud storage and memory. Here's some of the critical attributes of cloud storage of the CXL transformation is evolving, and the evolution of the cloud. To stay up to date on future episodes, please be sure to subscribe to the Marvell Essential Technology Podcast.

G Gary Kotzur 00:38

Jon, what do you see as the critical attributes of Cloud Storage? And what are you and Marvell doing to address them as storage evolves?

J Jon Haswell 00:48

Well, the first thing that always hits me is the enormous scale of cloud. I mean, it is computing on an enormous worldwide basis, basically here. And partly because of the scale and needing to grow to scale, it's driving the evolution of architectures in storage, what storage is, is changing rapidly, much faster than ever has historically. So one of the key things that Marvell is doing is providing customized storage solutions. You know, if you go back 10-20 years there used to be one size fits all now, every hyperscaler, every cloud is actually architecturally different. So we're making sure we have all the IP and the capability for customized solutions. And what we want to do is make sure we can rapidly evolve those and create those those solutions in a very timely manner partnering with our customers, Gary, tell me, what is CXL?

G Gary Kotzur 01:39

CXL, it's a new technology, first of all, and it runs on top of PCIe. And it adds memory semantics such as load store, and it also adds cache coherency. So that enables devices that are connected to CXL to have much lower latency.

J Jon Haswell 01:58

Okay, so we're all aware of NVMe? Is CXL complementary to NVMe? Is it competing with NVMe?

G Gary Kotzur 02:04

I think when you sit back and look at it, you know, first of all, NVMe is you know, runs in the storage domain and CXL is a memory domain. When you compare performance and latency. CXL being a memory domain is about 1000 times lower than storage, and in this case, NVMe. So I think it's, you know, to clarify, we do not see NVMe displacing CXL in the memory domain, it's just just as does not run at the same speeds. Now, conversely, if you look at CXL, can it displace NVMe? I would say there may be some opportunities where you can use CXL for storage applications. But I think overall NVMe, well, you know, it's it has a solid place in the industry for several reasons. When you look at internal use, it's in widespread usage today across industry, both internal and external. But in the case of external, it's running NVMe over Fabrics (NVMe-oF). Right now one of the dominant players in this space is NVMe over TCP (NVMeoTCP), and that's widely used. And because Ethernet is so ubiquitous, and because it has advantages of being able to hook up most multiple host to a target, which is a challenge for protocols like PCIe and CXL, we think that there will always be a place for NVMe in the storage domain.

J Jon Haswell 03:36

So what do you see as the first CXL products that are going to come out?

G Gary Kotzur 03:40

Well, when you talk to customers, the first pain point that they've identified is memory. Memory is expensive. There are cases where they need additional memory for either capacity expansion, or for performance expansion. So within that context, we see that the first product is going to be a CXL memory expander. And this will allow customers that capability of expansion for both capacity and performance. Now, the other case of where we see advantages for memory is what we call memory pooling. So customers whenever they run a server cluster, and they have their servers that are provisioned for the most demanding workloads, what we see is that in a cluster, as workloads, vary memory is stranded. So you have inefficient use of memory. There was an example that was given where Microsoft and Carnegie Mellon did a paper where they they found that about 25% of memory is stranded. So whenever you look at memory pooling, it is going to help in that situation, being able to you know, lower the overall utilization of memory and saving datacenters millions of dollars. Now, later on, we see that there's going to be advantages for other resources such as accelerators, which are like GPUs, FPGAs, and so forth, but also for IO devices, and also even storage itself. So the same attributes that we see for memory are going to be afforded for these other resources. But instead of using a polling device, you will be using a CXL switch device, along with devices that are CXL capable.

J Jon Haswell 05:26

So Gary, how does Marvell address these different types of cloud?

G Gary Kotzur 05:29

Well, you know, fortunately, most of the devices are common between the data centers, whether that be, you know, public cloud, or cloud edge and network. You know, it's SSD and harddrives. And also now we have CXL that's added to the equation, there is a maybe a a small area that has, you know, environmentally challenged, or a security challenge that we have to work with those customers to make sure that we meet their requirements. The other interesting thing, John, is that whenever you're talking about storage, and you talked about custom devices, whether it be for the SSD, or we have accelerators, for either security, or maybe for IO virtualization, the same thing applies not just for storage, but also for the memory domain. And so we see opportunities, either providing standard devices, and we see opportunities for providing custom devices, across these all different types of clouds.

J Jon Haswell 06:26

People talk about the various aspects of the cloud, you know, we have the hyperscaler cloud, the network cloud, the edge cloud, it's public, it's private, it's hybrid. How is Marvell addressing all of that?

G Gary Kotzur 06:37

So when cloud started out, I mean, it was very simple. I mean, you had one hyperscaler, then later on you had several. And so it was public cloud was your only offering. Now, as technology has advanced, telecommunications has advanced, now we have the Internet of Things (IoT), we see this wide expanse of different types of datacenter needs. So what we're seeing is that if you were to have a graph where you said, I have a large data center on one end, and on the other end, I have the Internet of Things, you start having these other levels of a data center in between those two different data points. So what we're seeing is that the data at large data center makes use of all the devices it has use for SSDs as a use for for hard drives, as well as accelerators. But as you start moving towards the data centers that are closer to the Internet of Things, one of the predominant needs are latency. So you start seeing a drive for use of no pun intended, of using more SSD, rather than hard drives. There were other aspects as you start getting even closer to the internet of things, such as you have smaller rooms, you also have maybe even cabinets, so what happens is that you have more extreme temperatures and humidity, needs for more security, and so forth. And so those devices have, you know, a niche where they, they're going to be needed for these more environment challenged areas. So when you step back and look at that, we see that there's going to be this wide need for all these different data centers, some call them cloud edge. And then there's also the network edge just to give an example. But let me take another perspective, from the customer's view, the customer, he could have a public cloud, or he can use a private cloud, or he can use what's called hybrid, which is utilization of both. And even within that context, they have different levels, you can have infrastructure as a support or storage as a service. In the case of private cloud, this is a situation where the customer has his own equipment that is provided by either by a public cloud vendor, or could it be by enterprise. And he can, you know, either have that located on site, or he could have it off site. Off site could be his own data center. Or he could have a co-location center, where they maintain the equipment and keep it within within their data center. Now, hybrid cloud, as I mentioned before, is a combination of the two. But it gives the customer the best of both worlds. So he can be running his business on both private and public, and he can rebalance as he needsto.

J Jon Haswell 09:33

Well, Gary, thanks for taking the time to talk to me. I appreciate it. It's been interesting. Getting your perspective.

G Gary Kotzur 09:37

Well, thanks, Jon. And likewise, I enjoyed talking to you about and getting your perspective. I think this is a really interesting area and the cloud environment will keep growing and evolving. So I think there's a lot of interesting things that will happen in the future.

C Christopher Banuelos 09:54

Thank you for listening to the Marvell Essential Technology Podcast. As always, please feel free to visit. our website to learn more and we'll see you on the next episode.



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